*Installation Instructions*

# Compact™ Expansion Power Supplies

(Cat. No. 1769-PA2, -PB2, -PA4, -PB4)

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# Safety Considerations

Safety considerations are an important element of proper system installation. Actively thinking about the safety of yourself and others, as well as the condition of your equipment, is of primary importance. We recommend reviewing the following safety considerations.

## Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only. The following WARNING statement applies to use in hazardous locations.

**WARNING** EXPLOSION HAZARD

- Substitution of components may impair suitability for Class I, Division 2.
- Do not replace components or disconnect equipment unless power has been switched off.
- Do not connect or disconnect components unless power has been switched off.
- This product must be installed in an enclosure.
- All wiring must comply with NEC Article 501-4(b).

## Environnements dangereux

Cet équipement est conçu pour être utilisé dans des environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux. La mise en garde suivante s'applique à une utilisation dans des environnements dangereux.

**MISE EN GARDE** DANGER D'EXPLOSION

- La substitution de composants peut rendre cet équipement impropre à une utilisation en environnement de Classe 1, Division 2.
- Ne pas remplacer de composants ou déconnecter l'équipement sans s'être assuré que l'alimentation est coupée.
- Ne pas connecter ou déconnecter des composants sans s'être assuré que l'alimentation est coupée.
- Ce produit doit être installé dans une armoire.

## Safety Circuits

**WARNING**

Explosion Hazard - Do not connect or disconnect connectors while circuit is live.

Circuits installed on the machine for safety reasons, like overtravel limit switches, stop push buttons, and interlocks, should always be hard-wired directly to the master control relay. These devices must be wired in series so that when any one device opens, the master control relay is de-energized, thereby removing power to the machine. Never alter these circuits to defeat their function. Serious injury or machine damage could result.

## Power Distribution

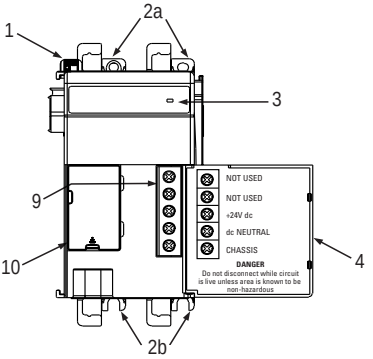
There are some points about power distribution that you should know:

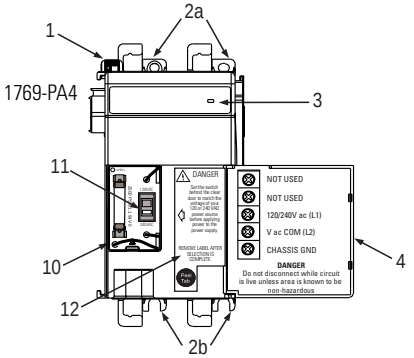
- The master control relay must be able to inhibit all machine motion by removing power to the machine I/O devices when the relay is de-energized. It is recommended that the controller remain powered even when the master control relay is de-energized.
- If you are using a dc power supply, interrupt the load side rather than the ac line power. This avoids the additional delay of power supply turn-off. The dc power supply should be powered directly from the fused secondary of the transformer. Power to the dc input and output circuits should be connected through a set of master control relay contacts.

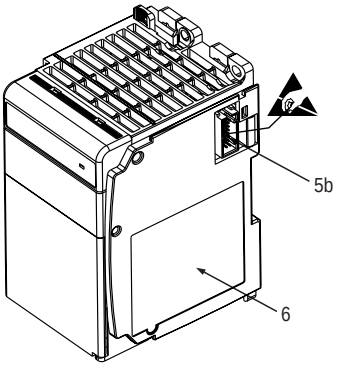
## Periodic Tests of Master Control Relay Circuit

Any part can fail, including the switches in a master control relay circuit. The failure of one of these switches would most likely cause an open circuit, which would be a safe power-off failure. However, if one of these switches shorts out, it no longer provides any safety protection. These switches should be tested periodically to assure they will stop machine motion when needed.

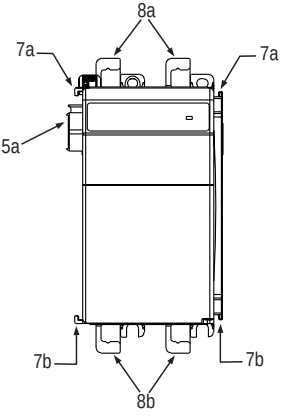
# Power Supply Description




| Item | Description |
|---|---|
| **1** | bus lever (with locking function) |
| **2a** | upper panel mounting tabs |
| **2b** | lower panel mounting tabs |
| **3** | green power LED |
| **4** | power supply door with terminal identification label |
| **5a** | movable bus connector with female pins |
| **5b** | stationary bus connector with male pins |
| **6** | nameplate label |
| **7a** | upper tongue-and-groove slots |
| **7b** | lower tongue-and-groove slots |
| **8a** | upper DIN rail latches |
| **8b** | lower DIN rail latches |
| **9** | terminal block with finger-safe cover |
| **10** | fuse housing cover for replaceable fuse |
| **11** | 120V ac or 240V ac line input power selector switch (PA4 only) |
| **12** | selector switch label (PA4 only) |



# Expansion I/O Power Supply Installation

Compact Expansion I/O Power Supplies are suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments (Pollution degree 2[1]) and to circuits not exceeding Over Voltage Category II[2] (IEC 60664-1).[3]

## Prevent Electrostatic Discharge

**ATTENTION**

Electrostatic discharge can damage integrated circuits or semiconductors if you touch bus connector pins. Follow these guidelines when you handle the power supply:

- Touch a grounded object to discharge static potential.
- Wear an approved wrist-strap grounding device.
- Do not touch the bus connector or connector pins.
- Do not touch circuit components inside the power supply.
- If available, use a static-safe work station.
- When not in use, keep the power supply in its static-shield bag.

## Remove Power

**ATTENTION**

Remove power before removing or inserting this power supply from the 1769 I/O system. When you remove or insert a power supply with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion
- causing an explosion in a hazardous environment

Electrical arcing causes excessive wear to contacts on both the power supply and its mating connector. Worn contacts may create electrical resistance.

(1) Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation shall be expected.

(2) Over Voltage Category II is the load level section of the electrical distribution system. At this level transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.

(3) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

# System Assembly

1769 Compact I/O power supplies distribute power from either side of the power supply. For example, a 2 amp at 5V dc power supply (1769-PA2, -PB2) can provide 1 amp to the right side of the power supply and 1 amp to the left. A 4 amp at 5V dc power supply (1769-PA4, -PB4) can provide 2 amps to the right side of the power supply and 2 amps to the left. The maximum amount of current the system supports in *both* directions is shown below:

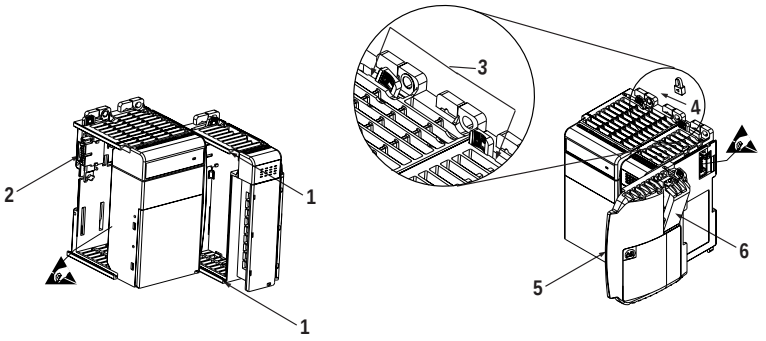
- 1769-PA2, -PB2: 2 amps at 5V dc; 1 amp at 24V dc
- 1769-PA4, -PB4: 4 amps at 5V dc; 2 amps at 24V dc

**NOTE** The maximum amount of current that can be distributed from *either* side of any 1769 power supply is:

- 2 amps at 5V dc; 1 amp at 24V dc.

This is a limit of the 1769 Compact I/O Bus.

The power supply can be attached to an adjacent I/O module *before* or *after* mounting. The following procedure shows you how to assemble the Compact I/O system.




1. Disconnect your line power. (The power supply does not support removal or insertion of modules under power.)
2. Check that the bus lever of the power supply to be installed is in the unlocked (fully right) position.
3. Use the upper and lower tongue-and-groove slots (1) to secure the power supply to an I/O module.
4. Move the power supply back along the tongue-and-groove slots until the bus connectors (2) line up with each other.
5. Push the bus lever back slightly to clear the positioning tab (3). Use your fingers or a small screwdriver.

6. To allow communication between the controller and the I/O, move the bus lever of the power supply and its adjacent I/O modules fully to the left (4) until it clicks. Ensure it is locked firmly in place.

**ATTENTION**

When attaching expansion I/O power supplies, it is very important that the bus connectors are securely locked together to ensure proper electrical connection.

7. Attach an end cap terminator (5) to the last I/O module in the system by using the tongue-and-groove slots as before.
8. Lock the end cap bus terminator (6).

**IMPORTANT** A 1769-ECR or 1769-ECL right or left end cap (respectively) must be used to terminate the end of the serial communication bus.

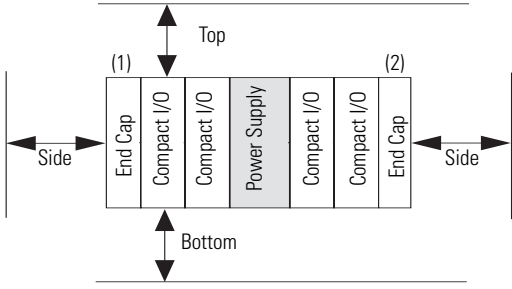
# Mounting an Expansion I/O Power Supply

**ATTENTION**

During panel or DIN rail mounting of all devices, be sure that all debris (metal chips, wire strands, etc.) is kept from falling into the module. Debris that falls into the module could cause damage on power up.

## Minimum Spacing

Maintain spacing from enclosure walls, wireways, adjacent equipment, etc. Allow 50 mm (2 in.) of space on all sides for adequate ventilation, as shown:




(1) This could be an end cap, controller, adapter or expansion cable depending on your system configuration.

(2) This could be an end cap or expansion cable depending on your system configuration.

## Preventing Excessive Heat

For most applications, normal convective cooling keeps the system within the specified operating range. Ensure that the specified temperature range is maintained. Proper spacing of components within an enclosure is usually sufficient for heat dissipation.

In some applications, a substantial amount of heat is produced by other equipment inside or outside the enclosure. In this case, place blower fans inside the enclosure to assist in air circulation and to reduce “hot spots” near the system.

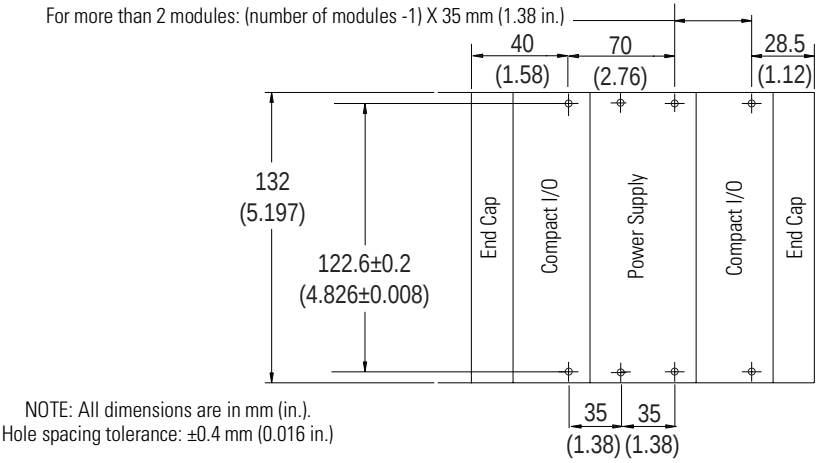
Additional cooling provisions might be necessary when high ambient temperatures are encountered.

**NOTE** Do not bring in unfiltered outside air. Place the Compact I/O system in an enclosure to protect it from a corrosive atmosphere. Harmful contaminants or dirt could cause improper operation or damage to components. In extreme cases, you may need to use air conditioning to protect against heat build-up within the enclosure.

## Panel Mounting

Mount the power supply to a panel using four screws per module. Use M4 or #8 panhead screws. Mounting screws are required on each power supply panel mounting tab.

### *Panel Mounting Using the Dimensional Template*

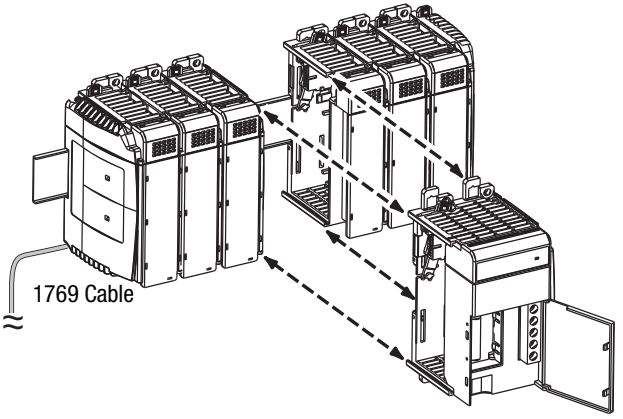


## DIN Rail Mounting

The power supply can be mounted using the following DIN rails: 35 x 7.5 mm (EN 50 022 - 35 x 7.5) or 35 x 15 mm (EN 50 022 - 35 x 15).

Before mounting a power supply or module on a DIN rail, close the DIN rail latches. Press the DIN rail mounting area of the module against the DIN rail. The latches will momentarily open and lock into place.

The following illustration shows a power supply being attached to the I/O modules in a DIN rail mounted Compact I/O system.




# System Power Budget Calculation and Considerations

The following *example* is provided to illustrate system power budget validation using 1769 power supplies. The table on the following page accounts for the amount of 5V dc and 24V dc current consumed by a 1769-ADN DeviceNet adapter (if used), 1769 Compact I/O modules and user supplied equipment (24V dc sensors).

## System Power Budget Calculation Example

The table below can be used to help determine your total I/O module power draw from the 1769 system power supply and, also, the remaining power available (power budget).

| Catalog Number[1] | n | A | B | n x A | n x B |
|---|---|---|---|---|---|
| | Number of Modules in the Bank | Module Current Requirements | | Calculated Current | |
| | | at 5V dc (mA) | at 24V dc (mA) | at 5V dc (mA) | at 24V dc (mA) |
| 1769-ADN | | 450 | 0 | | |
| 1769-IA16 | | 115 | 0 | | |
| 1769-IA8I | | 90 | 0 | | |
| 1769-IM12 | | 100 | 0 | | |
| 1769-IQ16 | 2 | 115 | 0 | 230 | 0 |
| 1769-IQ6XOW4 | 1 | 105 | 50 | 105 | 50 |
| 1769-OA8 | | 145 | 0 | | |
| 1769-OB16 | 1 | 200 | 0 | 200 | 0 |
| 1769-OB16P | | 160 | 0 | | |
| 1769-OV16 | | 200 | 0 | | |
| 1769-OW8 | 2 | 125 | 100 | 250 | 200 |
| 1769-OW8I | | 125 | 100 | | |
| 1769-IF4 (A) | | 120 | 150 | | |
| 1769-IF4 (B) | | 120 | 60 | | |
| 1769-OF2 (A) | | 120 | 200 | | |
| 1769-OF2 (B) | | 120 | 120 | | |
| 1769-ECR[2] | | 5 | 0 | | |
| 1769-ECL[2] | | 5 | 0 | | |
| User 24V Sensor Current Total: | | | | | 0 mA (example)[3] |
| Total Modules[4]: | 6 | Total[5]: | | 785 | 250 |

(1) Refer to the specific I/O module's installation instructions for the module's power supply distance rating. The module must be installed within the distance rating from the power supply.

(2) One 1769-ECR or 1769-ECL end cap/terminator is required in the system. The end cap/terminator used is dependent on your configuration.

(3) Applies to 1769-PA2 only.

(4) The total number of I/O modules cannot exceed 16 on a single bank with a maximum of eight I/O modules on either side of the power supply. (When configuring your system using a MicroLogix 1500 controller, only one expansion cable, one expansion power supply and a total of eight I/O modules may be used in a maximum of two banks of I/O modules. The expansion power supply cannot be directly connected to the MicroLogix 1500 controller.)

(5) The maximum amount of current that must be distributed from either side of a 1769 power supply is 2 amps at 5V dc and 1 amp at 24V dc, regardless of its total output capacity.

# System Power Budget Calculation Worksheet

| Catalog Number[1] | n | A | B | n x A | n x B |
|---|---|---|---|---|---|
| | Number of Modules in the Bank | Module Current Requirements | | Calculated Current | |
| | | at 5V dc (mA) | at 24V dc (mA) | at 5V dc (mA) | at 24V dc (mA) |
| 1769-ADN | | 450 | 0 | | |
| 1769-IA16 | | 115 | 0 | | |
| 1769-IA8I | | 90 | 0 | | |
| 1769-IM12 | | 100 | 0 | | |
| 1769-IQ16 | | 115 | 0 | | |
| 1769-IQ6XOW4 | | 105 | 50 | | |
| 1769-OA8 | | 145 | 0 | | |
| 1769-OB16 | | 200 | 0 | | |
| 1769-OB16P | | 160 | 0 | | |
| 1769-OV16 | | 200 | 0 | | |
| 1769-OW8 | | 125 | 100 | | |
| 1769-OW8I | | 125 | 100 | | |
| 1769-IF4 (A) | | 120 | 150 | | |
| 1769-IF4 (B) | | 120 | 60 | | |
| 1769-OF2 (A) | | 120 | 200 | | |
| 1769-OF2 (B) | | 120 | 120 | | |
| 1769-ECR[2] | | 5 | 0 | | |
| 1769-ECL[2] | | 5 | 0 | | |
| User 24V Sensor Current Total: | | | | | 0 mA (example)[3] |
| Total Modules[4]: | | Total[5]: | | | |

(1) Refer to the specific I/O module's installation instructions for the module's power supply distance rating. The module must be installed within the distance rating from the power supply.

(2) One 1769-ECR or 1769-ECL end cap/terminator is required in the system. The end cap/terminator used is dependent on your configuration.

(3) Applies to 1769-PA2 only.

(4) The total number of I/O modules cannot exceed 16 on a single bank with a maximum of eight I/O modules on either side of the power supply. (When configuring your system using a MicroLogix 1500 controller, only one expansion cable, one expansion power supply and a total of eight I/O modules may be used in a maximum of two banks of I/O modules. The expansion power supply cannot be directly connected to the MicroLogix 1500 controller.)

(5) The maximum amount of current that must be distributed from either side of a 1769 power supply is 2 amps at 5V dc and 1 amp at 24V dc, regardless of its total output capacity.

## Steps to Validate Your System Power

1. After you have calculated the amount of current consumed by your system, use the current graphs on pages 25-30 to verify that your power supply has adequate capacity for its bank of I/O modules.
2. To do so, compare the current graphs to your calculated totals for the following:
   - total 5V dc
   - total 24V dc
   - total 24V dc sensor power (1769-PA2 only)
3. If your power supply load is at or above the limits of the allowable ranges shown in the graphs on pages 25-30, you must add an additional I/O bank. See *Connecting Power Supplies* on pages 17 and 18 for additional information.

**IMPORTANT**

- The additional I/O bank must include its own power supply.
- An end cap/terminator (1769-ECR or 1769-ECL) must also be used if the I/O bank is the last in the system.

# Power Considerations

The following explains power considerations for the Compact I/O system.

## Disconnecting Main Power

**WARNING**

Explosion Hazard - Do not replace components or disconnect equipment unless power has been switched off.

The main power disconnect switch should be located where operators and maintenance personnel have quick and easy access to it. In addition to disconnecting electrical power, all other sources of power (pneumatic and hydraulic) should be de-energized before working on a machine or process controlled by a controller.

## Isolation Transformers

You may want to use an isolation transformer in the ac line. This type of transformer provides isolation from your power distribution system to reduce electrical noise and is often used as a step down transformer to reduce line voltage. Any transformer used with the Compact I/O system must have a sufficient power rating for its load. The power rating is expressed in volt-amperes (VA). See schematics on pages 16 and 17 for an example of circuits using isolation transformers.

## Power Supply Inrush

During power-up, the power supply allows a brief inrush current to charge internal capacitors. Many power lines and control transformers can supply inrush current for a brief time. If the power source cannot supply this inrush current, the source voltage may sag momentarily.

The only effect of limited inrush current and voltage sag on the system is that the power supply capacitors charge more slowly. However, the effect of a voltage sag on other equipment should be considered. For example, a deep voltage sag may reset a computer connected to the same power source. The following considerations determine whether the power source must be required to supply high inrush current:

- The power-up sequence of devices in a system.
- The amount of the power source voltage sag if the inrush current cannot be supplied.
- The effect of voltage sag on other equipment in the system.

If the entire system is powered-up at the same time, a brief sag in the power source voltage typically will not affect any equipment.

## Loss of Power Source

The power supply is designed to withstand brief power losses without affecting the operation of the system. The time the system is operational during power loss is called “program scan hold-up time after loss of power.” The duration of the power supply hold-up time depends on the type and state of the I/O, but is typically between 5 milliseconds and 10 seconds. When the duration of power loss reaches this limit, the power supply signals the processor that it can no longer provide adequate dc power to the system. This is referred to as a power supply shutdown. The processor then performs an orderly shutdown of the controller.

## Input States on Power Down

The power supply hold-up time as described above is generally longer than the turn-on and turn-off times of the inputs. Because of this, the input state change from “On” to “Off” that occurs when power is removed may be recorded by the processor before the power supply shuts down the system. Understanding this concept is important. The user program should be written to take this effect into account.

### Other Types of Line Conditions

Occasionally the power source to the system can be temporarily interrupted. It is also possible that the voltage level may drop substantially below the normal line voltage range for a period of time. Both of these conditions are considered to be a loss of power for the system.

## User Power Overcurrent Condition

The power supply shuts down in the event of an overcurrent condition. All outputs latch off and remain of until the overcurrent is removed and the power is cycled. Reload the user program following a power supply shutdown.

**ATTENTION**

To avoid unexpected operation due to 24V dc user power shutdown (1769-PA2 only), monitor the 24V dc user output with a 24V dc input channel.

## Master Control Relay

A hard-wired master control relay (MCR) provides a reliable means for emergency machine shutdown. Since the master control relay allows the placement of several emergency-stop switches in different locations, its installation is important from a safety standpoint. Overtravel limit switches or mushroom head push buttons are wired in series so that when any of them opens, the master control relay is de-energized. This removes power to input and output device circuits.

**ATTENTION**

Never alter these circuits to defeat their function since serious injury and/or machine damage could result.

**NOTE**

- If you are using an external dc power supply, interrupt the dc output side rather than the ac line side of the supply to avoid the additional delay of power supply turn-off.
- The ac line of the dc output power supply should be fused.
- Connect a set of master control relays in series with the dc power supplying the input and output circuits.

Place the main power disconnect switch where operators and maintenance personnel have quick and easy access to it. If you mount a disconnect switch inside the enclosure, place the switch operating handle on the outside of the enclosure, so that you can disconnect power without opening the enclosure.

Whenever any of the emergency-stop switches are opened, power to input and output devices should be removed.

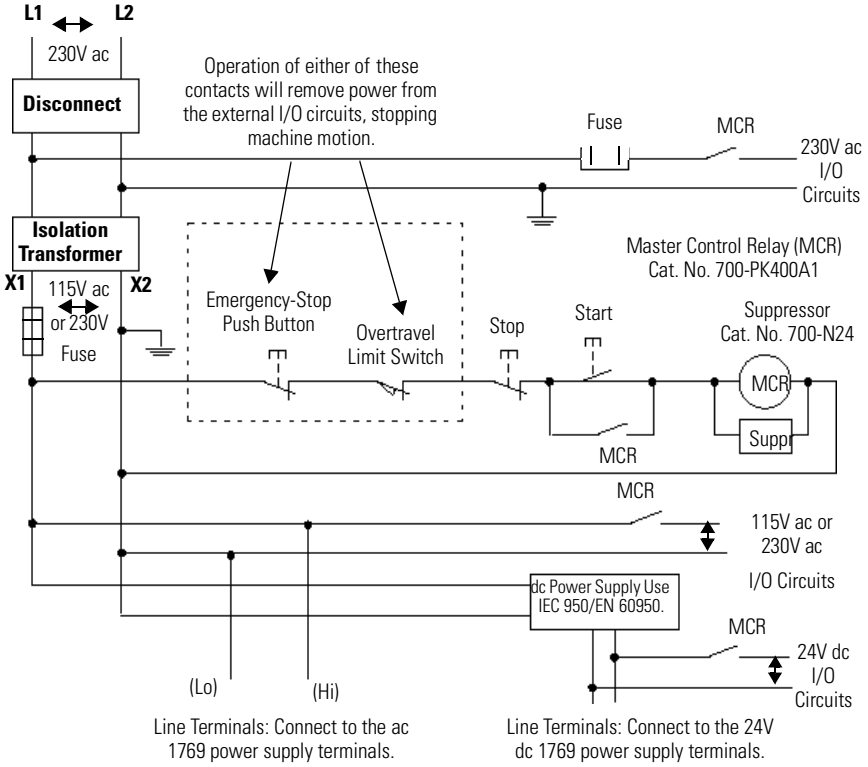
When you use the master control relay to remove power from the external I/O circuits, power continues to be provided to the system's power supply so that diagnostic indicators on the processor can still be observed.

The master control relay is not a substitute for a disconnect to the system. It is intended for any situation where the operator must quickly de-energize I/O devices only. When inspecting or installing terminal connections, replacing output fuses, or working on equipment within the enclosure, use the disconnect to shut off power to the rest of the system.

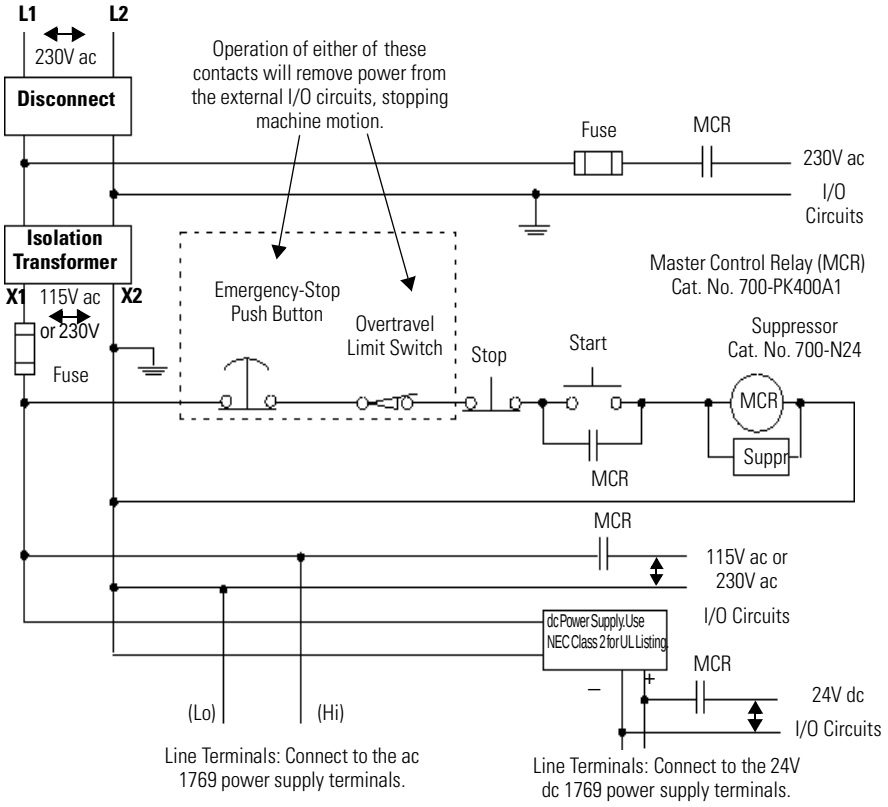
**NOTE**

Do not control the master control relay with the Compact I/O system. Provide the operator with the safety of a direct connection between an emergency-stop switch and the master control relay.

## Schematic (Using IEC Symbols)



## Schematic (Using ANSI/CSA Symbols)




# Connecting Power Supplies

Compact I/O system architecture and the power supply design support connection of I/O on either side of the power supply.

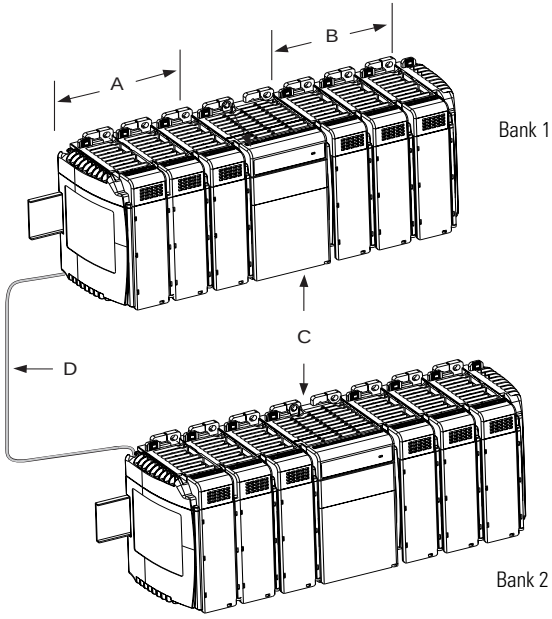
Each I/O bank requires its own power supply. To connect two I/O banks, attach a 1769 expansion I/O cable to a power supply or I/O module as shown in the following illustration.

**NOTE** Up to eight I/O modules can be connected on either side (A or B in the figure below) of the power supply for a maximum of 16 modules per bank.

Each 1769 I/O module has a power supply distance rating, with a maximum value of 8. Refer to the specific 1769 I/O module's installation instructions for more information.

The maximum amount of Bus current that can be distributed on the 1769 Bus (on *either side* of the power supply, A or B below) is:

- 2 amps at 5V dc (assume supported by power supply)
- 1 amp at 24V dc (assume supported by power supply)




| Item | Description |
|---|---|
| **A** | Up to eight I/O modules can be connected on *either* side of the power supply |
| **B** | |
| **C** | expansion I/O power supplies |
| **D** | I/O communication expansion cable |

**IMPORTANT** To use a 1769 expansion I/O power supply with a controller that has an embedded power supply (e.g. MicroLogix 1500), you *must* use a 1769 expansion I/O cable. Do not directly attach the expansion power supply to a controller which has an embedded power supply.

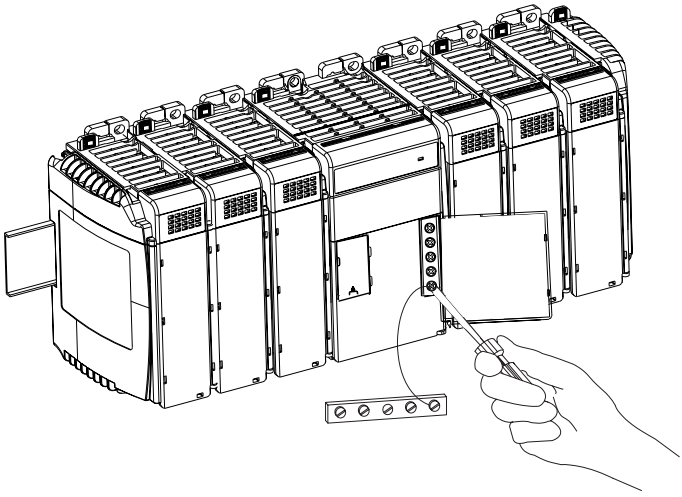
# Field Wiring Connections

## Grounding the Power Supply

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the power supply's mounting tabs or DIN rail (if used), are not required unless the mounting surface cannot be grounded. Refer to *Industrial Automation Wiring and Grounding Guidelines*, Allen-Bradley publication 1770-4.1, for additional information.

## Power Supply Wiring

1. **1769-PA4 only** - Set the VAC line input power switch behind the clear door to match your 120V or 240V ac power source as directed by the *DANGER* label on the power supply. The switch is shipped from the factory in 240V ac position.
2. Connect the ground screw of the power supply to the nearest ground or ground bus. Use a #14 AWG wire and keep the leads as short as possible.



**NOTE**

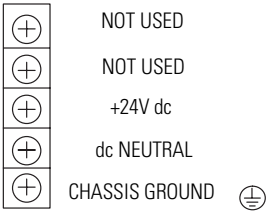
This ⏚ symbol denotes a protective earth ground terminal which provides a low impedance path between electrical circuits and earth for safety purposes and provides noise immunity improvement. This connection must be made for safety purposes.

**3.** Connect incoming power to the power supply terminals as indicated below.

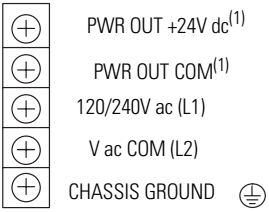
**ATTENTION**

Turn off incoming power before connecting or disconnecting wires. Failure to do so could cause injury to personnel and/or damage to equipment.

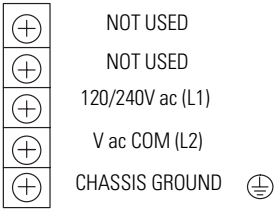
**Catalog Number 1769-PB2, -PB4**



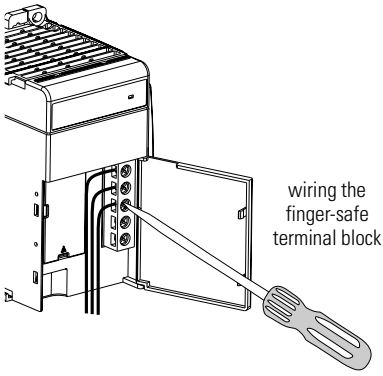

**Catalog Number 1769-PA2**




**Catalog Number 1769-PA4**




(1) 24V dc user power for sensors or other special 24V dc I/O devices




## Wiring the Finger-Safe Terminal Block

When wiring the terminal block, keep the finger-safe cover in place.

1. Loosen the terminal screws to be wired.
2. Route the wire under the terminal pressure plate. You can use the bare wire or a spade lug. The terminals will accept a 6.35 mm (0.25 in.) spade lug.

**NOTE** The terminal screws are non-captive. Therefore, it is possible to use a ring lug [maximum 1/4 inch o.d. with a 0.139 inch minimum i.d. (M3.5)] with the module.

3. Tighten the terminal screw making sure the pressure plate secures the wire. Recommended torque when tightening terminal screws is 1.27 Nm (11.24 in-lbs).

**NOTE** If you need to remove the finger-safe cover, insert a screwdriver into one of the square wiring holes and gently pry the cover off. If you wire the terminal block with the finger-safe cover removed, you will not be able to put it back on the terminal block because the wires will be in the way.

## Wire Size and Terminal Screw Torque

Each terminal accepts up to two wires with the following restrictions:

| Wire Type | | Wire Size | Terminal Screw Torque |
|---|---|---|---|
| Solid | Cu-90°C (194°F) | #14 AWG | 1.27 Nm (11.24 in-lbs) |

# Fuse Replacement Procedure

**ATTENTION**

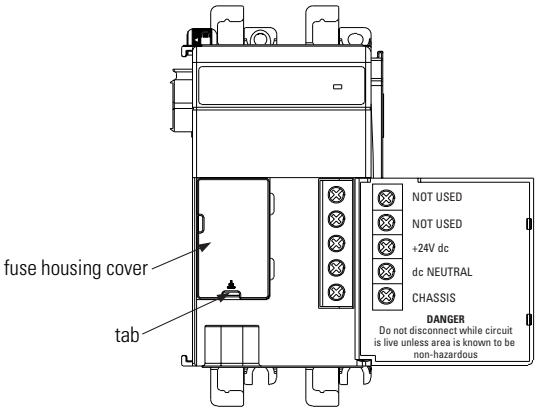
Never install, remove, or wire power supplies unless power has been switched off.

To replace a blown fuse:

1. Remove Compact I/O system power and correct the conditions causing the short circuit.
2. Remove fuse housing cover (shown in figure below). Place a slotted screwdriver under the tab to remove.
3. Remove the front access fuse.

   Use a fuse puller or similar device to remove the fuse. Use care so that the printed circuit board and surrounding electronics are not damaged.
4. Replace the front access fuse. (See Specifications on page 24 for information on the front access fuse.)

   Center the replacement fuse over the fuse clip and press down. If a tool is used to press the fuse in place, apply pressure to the metal end caps only, not the center of the fuse.
5. Replace fuse housing cover.
6. Restore Compact I/O system power.



# Specifications

| Specification | 1769-PA2 | 1769-PB2 | 1769-PA4 | 1769-PB4 |
|---|---|---|---|---|
| Dimensions | 118 mm (height) x 87 mm (depth) x 70 mm (width) height including mounting tabs is 138 mm<br>4.65 in. (height) x 3.43 in (depth) x 2.76 in (width) height including mounting tabs is 5.43 in. | | | |
| Approximate Shipping Weight (with carton) | 525g (1.16 lbs.) | 525g (1.16 lbs.) | 630g (1.39 lbs.) | 630g (1.39 lbs.) |
| Storage Temperature | -40°C to +85°C (-40°F to +185°F) | | | |
| Operating Temperature | 0°C to +60°C (32°F to +140°F) | | | |
| Operating Humidity | 5% to 95% non-condensing | | | |
| Power Supply Distance Rating | 8 (Up to eight I/O modules can be connected on either side of the power supply for a maximum of 16 modules.) (1) | | | |
| Operating Altitude | 2000 meters (6561 feet) | | | |
| Vibration(2) | Operating: 10 to 500 Hz, 5G, 0.030 in. peak-to-peak | | | |
| Shock(3) | Operating: 30G panel mounted (20G DIN rail mounted)<br>Non-Operating: 40G panel mounted (30G DIN rail mounted) | | | |
| Agency Certification | C-UL certified (under CSA C22.2 No. 142)<br>UL 508 listed<br>CE compliant for all applicable directives | | | |
| Hazardous Environment Class | Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213) | | | |
| Radiated and Conducted Emissions | EN50081-2 Class A | | | |
| *Electrical /EMC:* | *The power supply has passed testing at the following levels:* | | | |
| ESD Immunity (IEC1000-4-2) | 4 kV contact, 8 kV air, 8 kV indirect | | | |
| Radiated Immunity (IEC1000-4-3) | 10 V/m, 80 to 1000 MHz, 80% amplitude modulation, +900 MHz keyed carrier | | | |
| Fast Transient Burst (IEC1000-4-4) | 2 kV, 5 kHz | | | |
| Surge Immunity (IEC1000-4-5) | 4 kV common mode, 2 kV differential mode(4) | 500 V common mode, 500 V differential mode | 4 kV common mode, 2 kV differential mode | 500 V common mode, 500 V differential mode |
| Conducted Immunity (IEC1000-4-6) | 10V, 0.15 to 80 MHz(5) | | | |

(1) When configuring your system using a MicroLogix 1500 controller, only one expansion cable, one expansion power supply and a total of eight I/O modules may be used in a maximum of two banks of I/O modules. The expansion power supply cannot be directly connected to the MicroLogix 1500 controller.

(2) If a relay module (e.g.1769-OW8) is used in the system, operating vibration is 2G.

(3) If a relay module is used in the system, operating shock is 7.5G panel mounted (5G DIN rail mounted).

(4) 24V user test voltage is 500 V common mode, 500 V differential mode.

(5) Conducted Immunity frequency range may be 150 kHz to 30 MHz if the Radiated Immunity frequency range is 30 MHz to 1000 MHz.

# Specifications (continued)

| Specification | 1769-PA2 | 1769-PB2 | 1769-PA4 | 1769-PB4 |
|---|---|---|---|---|
| Nominal Supply Voltage | 120/240V ac (no jumpers) | 24V dc | 120/240V ac selector switch | 24V dc |
| Voltage Range | 85 to 265V ac (wide range; no jumper or DIP switch required)<br>47 to 63 Hz | 19.2 to 31.2V dc | 85 to 132V ac or 170 to 265 (switch selectable)<br>47 to 63 Hz | 19.2 to 31.2V dc |
| Maximum Line Requirement | 100 VA at 120V ac<br>130 VA at 240V ac | 50 VA at 24V dc | 200 VA at 120V ac<br>240 VA at 240V ac | 100 VA at 24V dc |
| Green Input Power Available Diagnostic LED | ON (+5 and +24V dc current available from power supply)<br>OFF (No input power; Power-fail enabled, Overvoltage Exceeded/Protection Enabled) | | | |
| Maximum Inrush | 25A at 132V ac<br>10Ω source impedance<br>40A at 265V ac<br>10Ω source impedance | 30A at 31.2V dc | 25A at 132V ac,<br>10Ω source impedance<br>40A at 265V ac,<br>10Ω source impedance | 30A |
| Line Loss Ride Through | 10 ms (minimum) to 10s (maximum) | | 5 ms (minimum) to 10s (maximum) | |
| Output Bus Current Capacity (0°C to +55°C) | 2A at 5V dc<br>0.8A at 24V dc | 2A at 5V dc<br>0.8A at 24V dc | 4A at 5V dc<br>2A at 24V dc | 4A at 5V dc<br>2A at 24V dc |
| Output Bus Current Capacity (55°C to +60°C) | Refer to the Temperature Derating graphs on pages 25 through 30. | | | |
| Minimum Load Current | 0 mA at 5V dc; 0 mA at 24V dc | | | |
| 24V dc User Power Capacity (0°C to +55°C) | 250 mA(1) | NA | | |
| 24V dc User Power Capacity (>+55°C to +60°C) | 200 mA(1) | NA | | |
| +24V dc User Voltage Range | 20.4V dc to 26.4V dc | NA | | |
| Short Circuit Protection | Front Access Fuse<br>(Replacement part number: Wickmann 19195-3.15A, Wickmann 19343-1.6A, or Wickmann 19181-4A) | Front Access Fuse<br>(Replacement part number: Wickmann 19193-6.3A) | Front Access Fuse<br>(Replacement part number: Wickmann 19195-3.15A or Wickmann 19181-4A) | Front Access Fuse<br>(Replacement part number: Wickmann 19193-6.3A) |

(1) Refer to the Temperature Derating graphs on pages 25 through 30.



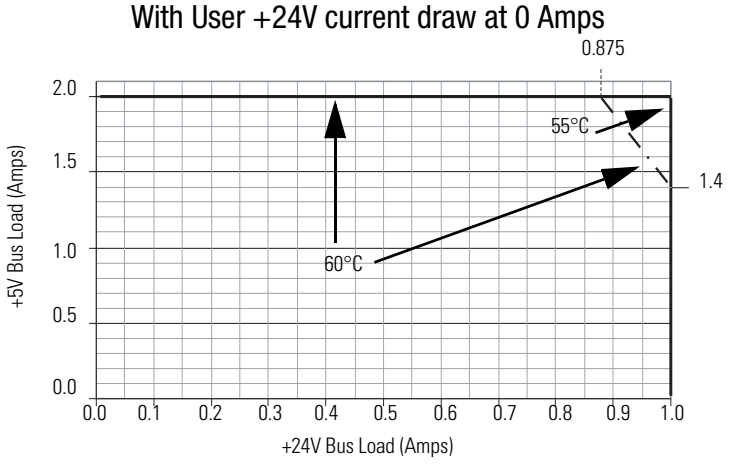
*Specifications table continued on next page.*

| Specification | 1769-PA2 | 1769-PB2 | 1769-PA4 | 1769-PB4 |
|---|---|---|---|---|
| +5V 1769 Bus Overvoltage Protection | Yes | | | |
| +24V 1769 Bus Overvoltage Protection | Yes | | | |
| Isolation Voltage (Input Power to 1769 Bus) | Verified by one of the following dielectric tests: | | | |
| | 1836V ac for 1s or 2596V dc for 1s | 1200V ac for 1s or 1697V dc for 1s | 1836V ac for 1s or 2596V dc for 1s | 1200V ac for 1s or 1697V dc for 1s |
| | 265V Working Voltage (IEC Class 1 - grounding required) | 75V Working Voltage (IEC Class 1 - grounding required) | 265V Working Voltage (IEC Class 1 - grounding required) | 75V Working Voltage (IEC Class 1 - grounding required) |

(1) Refer to the Temperature Derating graphs on pages 25 through 30.

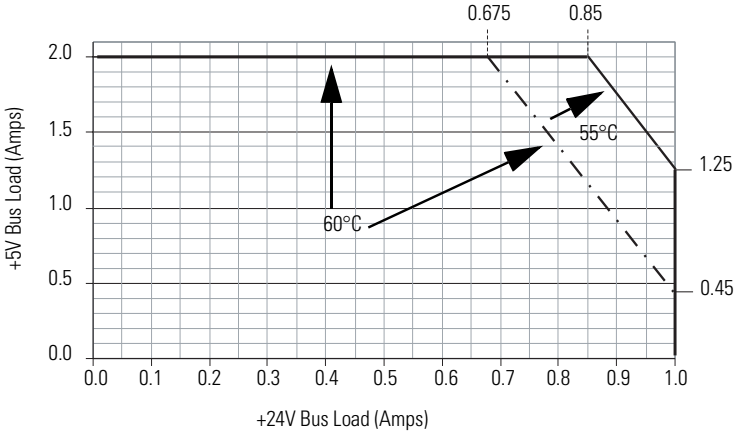
# Temperature Derating

## 1769-PA2 Output Derating

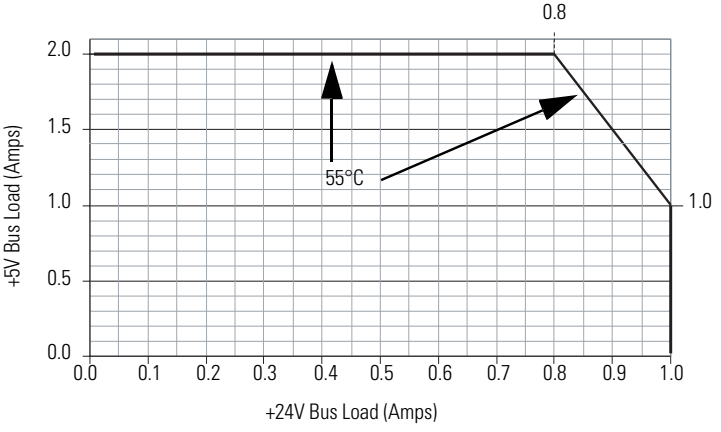


## 1769-PA2 Output Derating (continued)

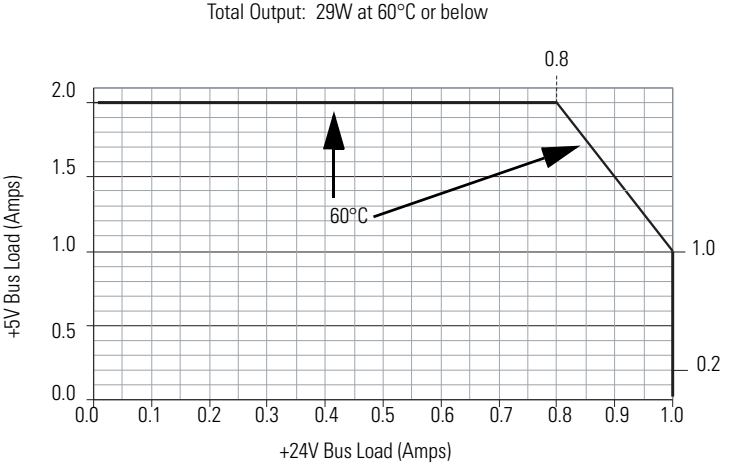
With User +24V current draw at 0.2 Amps



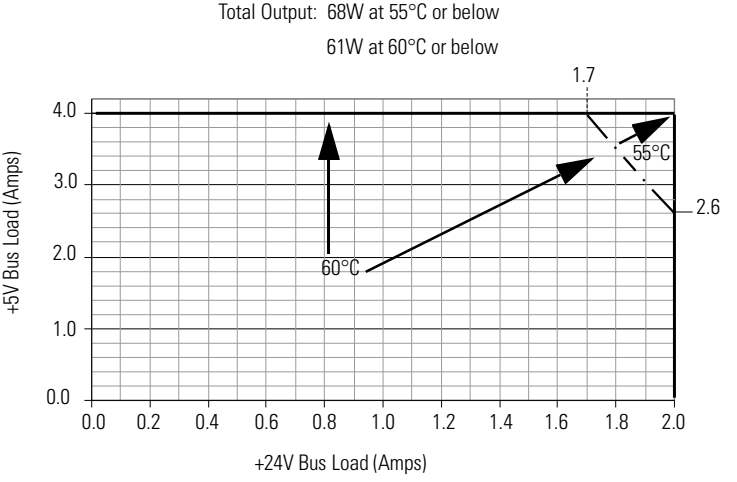

With User +24V current draw at 0.25 Amps



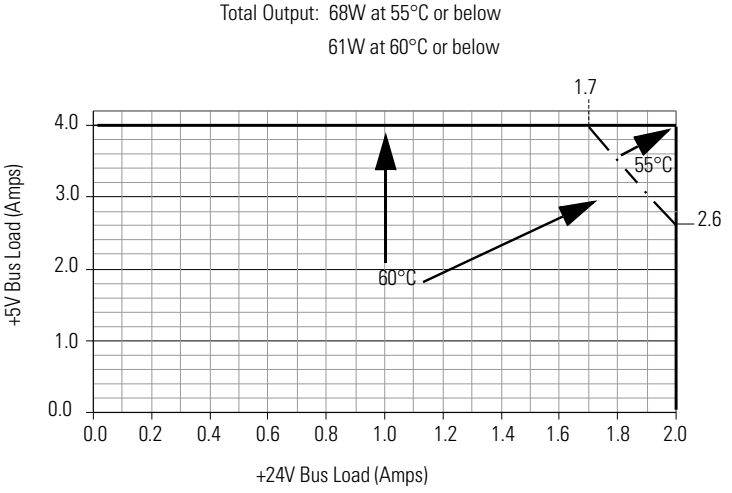
## 1769-PB2 Output Derating




## 1769-PA4 Output Derating

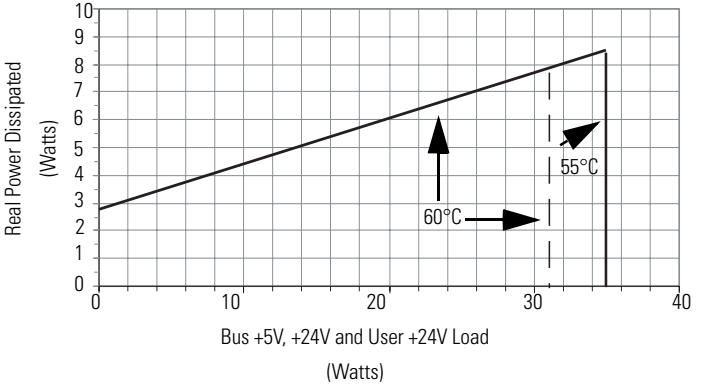


## 1769-PB4 Output Derating

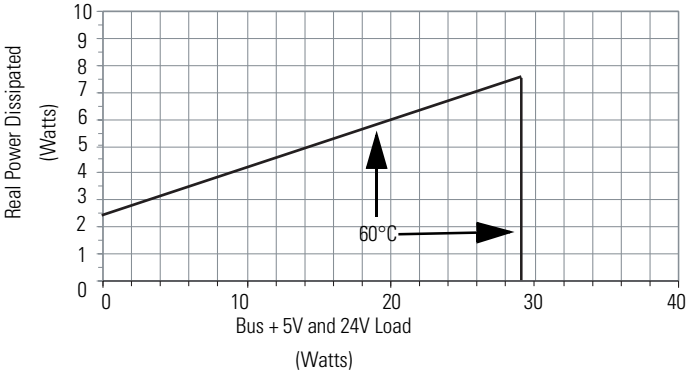



# Power Dissipation

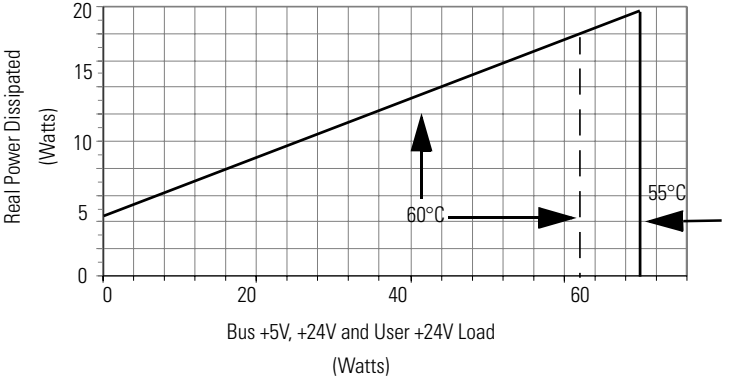
## 1769-PA2 Real Power Dissipation



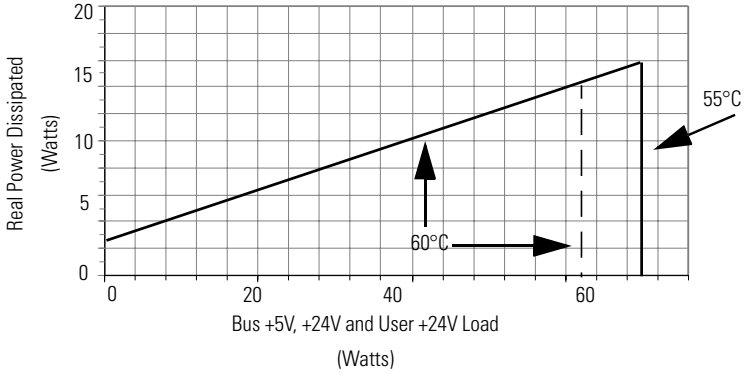
## 1769-PB2 Real Power Dissipation




## 1769-PA4 Real Power Dissipation



## 1769-PB4 Real Power Dissipation




# Compatibility with MicroLogix 1500

To use the 1769 expansion I/O power supply with the MicroLogix 1500 processor, the processor (catalog number 1764-LSP or 1764-LRP) must be Series A, Revision C, FRN 3 or higher. You can check the firmware revision by looking at:

- Status file bit S:59 (Operating System Firmware Revision Number)
- The processor nameplate

If your processor is at an older revision, you must upgrade the operating system. On the internet, go to **http://www.abmicrologix.com** to download the firmware upgrade.

# For More Information

| For | Refer to this Document | Pub. No. |
|---|---|---|
| A more detailed description of how to install and use a 1769-ADN DeviceNet Adapter Module | 1769-ADN Adapter User Manual | 1769-UM001A-US-P |
| A more detailed description of how to install and use Compact Analog I/O | Compact 1769 Analog I/O User Manual | 1769-UM002A-EN-P |
| A more detailed description of how to install and use your CompactLogix controller | CompactLogix System User Manual | 1769-UM007A-EN-P |
| A more detailed description of how to install and use your Compact I/O with the MicroLogix 1500 programmable controller | MicroLogix 1500 Programmable Controllers User Manual | 1764-UM001A-EN-P |
| An overview of the 1769 Compact I/O System | Compact I/O System Overview | 1769-SO001A-EN-P |
| An overview of the MicroLogix 1500 System, including 1769 Compact I/O | MicroLogix 1500 System Overview | 1764-SO001B-EN-P |
| Information on installing and using 1769 Compact I/O modules | Installation Instructions are included with each module. Also available via www.theautomationbookstore.com | 1769-INxxx |
| Information on installing and using Compact I/O Communication Bus Expansion Cables | Compact I/O Communication Bus Expansion Cables Installation Instructions | 1769-5.15 |
| Information on installing and using Compact 1769-ECR Right End Cap/Terminator | Compact 1769-ECR Right End Cap/ Terminator | 1769-5.9 |
| Information on installing and using Compact 1769-ECL Left End Cap/Terminator | Compact 1769-ECL Left End Cap/ Terminator | 1769-5.16 |
| An overview of the Compact 1769 Expansion I/O Power Supplies and Cables | Compact 1769 Expansion I/O Power Supplies and Cables Technical Data | 1769-TD001A-EN-P |
| An overview of 1769 Compact Discrete I/O Modules | 1769 Compact Discrete Input/ Output Modules Product Data | 1769-2.1 |
| More information on proper wiring and grounding techniques. | Industrial Automation Wiring and Grounding Guidelines | 1770-4.1 |

If you would like a manual, you can:

- download a free electronic version from the internet: **http://www.abmicrologix.com** or **www.theautomationbookstore.com**
- purchase a printed manual by:
  - contacting your local distributor or Rockwell Automation representative
  - visiting **www.theautomationbookstore.com** and placing your order
  - calling **1.800.963.9548** (USA/Canada) or **001.330.725.1574** (Outside USA/Canada)

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